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ABSTRACT

To examine the relationships between the external environment in which a high school exists and the internal structure of the school, a study compared selected resource variables in Connecticut communities and the internal organizational characteristics of the 25 high schools in those communities. The literature suggests external environmental variables can account for variance in organizational structure. The researchers tested the applicability of this theory to educational organizations by administering the Structural Properties Questionnaire (SPQ) to 30 randomly sampled high school teachers in each of 25 single high school districts in Connecticut, reviewing the records of the Connecticut Department of Education and the Connecticut Public Expenditures Council, and analyzing the relationships between the structural properties of the high schools and the community background variables. The study confirmed that community resource variables are related to bureaucratic characteristics in schools, and verified the usefulness of the SPQ as a valid and reliable tool for assessing structure in schools. The study also found that a community's wealth per capita negatively affects school centralization of power, and student and staff competition for resources accounts for school complexity and specialization. (DCS)

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INTERNAL STRUCTURE IN HIGH SCHOOLS AND COMMUNITY RESOURCE VARIABLES

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Internal Structure in High Schools
and
Community Resource Variables

OBJECTIVE

This research was conducted to examine relationships between selected community background variables and the internal organizational characteristics of high schools. The research question was developed from concerns about the applicability of general organizational theory to educational organizations. Specifically, what is the relationship between the external environment in which a high school exists and its internal structure? It was hoped that the research would produce information that would be beneficial to administrators as they plan to meet the challenges of changing community expectations and resources.

THEORETICAL FRAMEWORK

There exists agreement in the literature that external environmental variables can account for variance in organizational structure (Burns & Stalker, 1961; Blau & Scott, 1962; Emery & Trist, 1965; Katz & Kahn, 1966; Lawrence & Lorsch, 1967; Thompson, 1967; Terryberry, 1968; Pugh, Hickson, Hinings & Turner, 1969; Blau & Schoenherr, 1971, 1974; and Hall, 1972). For the purposes of this research, Katz and Kahn's (1966) view that the environment can be characterized as a variety of resources to be processed by the organization is most useful.

Public organizations are held to be different from other formal organizations because: (1) they process human objects, not physical ones; (2) the relationship of the organization to its clients is different; and (3) they are free from "market pressures" (Katz & Kahn, 1966, pp. 116-117). Carlson (1975) and Aldrich (1979) focused upon public schools' organizational adaptation to forces in their environment. They have stated that schools are different from other types of organizations because they are protected by society. Because of their protected status, i.e., public institutions rarely go out of business, schools have a diminished incentive to adapt to environmental pressures.

According to Weber (1946) bureaucracy is the dominant form of internal structuring in modern organizations. Hage (1965) proposed an "Axiomatic Theory of Organizations" consisting of four means (Complexity, Centralization, Formalization and Stratification) and four ends (Adaptiveness, Efficiency, Job Satisfaction and Production) related in a series of propositions and corollaries to test Weber's theories.

Hall (1961, 1962, 1963), Hage and Aiken (1967a, 1967b) and Pugh, Hickson, Hinings, and Turner (1968) have done extensive work on the assessment of internal structural dimensions in organizations. Bishop and George (1973) and Murphy, Bishop and George (1975) built upon the foundation laid by Hage and Aiken and developed the Structural Properties Questionnaire to assess the presence of Hage's

means constructs (Centralization, Complexity and Formalization) in schools. This study utilized the instrumentation of Murphy, Bishop and George to further our understanding of school organization by examining the relationship between internal structure of secondary schools and external community resource variables.

METHODOLOGY

The conceptual base for the study design was found in the work of Blau and others (Blau & Scott, 1962; Blau & Schoenherr, 1971, 1974; and Blau, 1974).

According to Blau (1974) organizational research has three foci: 1) the individual in role; 2) the structure of social relations; or 3) the system of interrelated elements that characterize the organization (p. 112-113). One focus of this research was Blau's (1974) "system of interrelated elements that characterize the organization" (p. 113). These interrelated elements were the bureaucratic properties of Centralization, Complexity, and Formalization that are found in Hage's Corollaries (1965) and which have been previously studied in public school settings by Bishop and George (1973) and Murphy, Bishop and George (1975).

The second focus of this study was the external environment as it influences the internal structuring of the organization. This was suggested by Blau and Schoenherr (1974). "Systematic comparison of many organizations is necessary to ascertain the general effects of their social

context on them" (p. 280).

According to Blau and Scott (1962) social research methods can be characterized by "the purposes for which the data was collected": 1) exploratory studies; 2) descriptive studies and 3) hypothesis testing studies. They can also be classified by "techniques employed in the collection of data": 1) observation; 2) interviewing or questionnaires; and 3) analysis of documents, or they can be classified "on the basis of the research design employed": 1) sample survey; 2) controlled experiment; and 3) field study (pp. 15-18).

The design used in this study was an ex post facto comparative one where a group of high schools was investigated in order to seek some generalizations about them as a class through hypothesis testing. The data collection procedures used were the questionnaire and a review of archival data and the design was a sample survey. The design was ex post facto because the independent and dependent variables were not being manipulated.

The observations of the independent variables were taken from the records of the Connecticut State Department of Education and the Connecticut Public Expenditure Council.

Many of the variables that were used in this study have definitions which are unique to their use in the study. For purposes of clarity the variables are listed here along with their study-specific definitions.

Demand Resource Variables are Community Population, District Enrollment, Size of District Staff, and Size of

School Staff.

Resource Competition Variables are ratios of demand and support for school or total community needs (e.g. ratio of School Budget to Town Budget).

Support Resource Variables are Ability, Effort, Net Current Local Expenditures and Per Pupil Expenditure.

Internal Resource Competition is competition for school district resources as measured by Enrollment Ratio, School Staff, and Teacher Ratio.

External Resource Competition is competition for Town Resources as measured by Staff Ratio, Budget Ratio, and Effort.

Ability (AENGLC) is defined as Adjusted Equalized Net Grand List Per Capita and includes measures of real and personal property.

Effort is defined to include measures of local funds spent for education, real and personal property, and family income.

Net Current Local Expenditures (NCLE) is defined as the total educational expenditures.

Per Pupil Expenditure (PP) is defined as the ratio of Current Local Expenditures to District Enrollment.

High School Enrollment (HSE) is defined as the number of pupils enrolled in the high school on October 1 of a school year.

Community Population (CP) is the number of town residents reported in the Town Profile Connecticut State Department of Education, 1980-1981.

District Enrollment (DE) is the total enrollment of the district.

School Budget (SB) is the total educational expenditure for a given year.

Town Budget (TB) is the total municipal budget for a given year.

School Staff (SS) is the number of classroom teachers in the school.

District Staff (DS) is the total number of classroom teachers in the district.

Town Staff (TS) is the total number of full-time non-school staff employed by the town.

Complexity (CO) is the level of specialization required. It includes: (a) number of occupational specialties, (b) level of professional training required, and (c) the extensiveness of professional involvement and related activities as assessed by the Structural Properties Questionnaire Form-IV (Murphy, Bishop and George, 1975)

Centralization (CE) is a measure of power distribution within the organization. It includes: (a) participation in decision-making and (b) the hierarchy of authority as assessed by the Structural Properties Questionnaire Form-IV (Murphy, Bishop and George, 1975).

Formalization (FO) is a measure of the degree of standardization and regulations. It includes: (a) job codification, role specificity, and standardization and (b) rule observation and professional latitude as assessed by the Structural Properties Questionnaire Form-IV (Murphy, Bishop and George, 1975).

A high degree of intercorrelation exists among several of the independent variables (cf. Thompson, 1983, p. 116). High multicollinearity can effect parameter estimates and produce an estimated regression coefficient that "may be so unstable that it fails to achieve statistical significance eventhough X is actually associated with Y in the population" (Lewis-Beck, 1980, p. 59). Because of these intercorrelations and the concomitant possibility of misinterpretation of the regression equations it was decided to factor analyze the independent variable data to see if the variables could be collapsed into a smaller and more reliable set of factors.

A Principal Component analysis with an oblique rotation was done for the 13 community background variables for the population. The oblique solution produced four interpretable factors with eigenvalues greater than one that accounted for 82 per cent of the explained variance. Factor I--Community Size included Community Population, Net Current Education Expenses, District Enrollment, High School Enrollment, and District Staff. Factor II--Ability to Support Education included Net Grand List Per Capita and Per Pupil Expenditure. Factor III--External Resource Competition included Staff Ratio, Budget Ratio and Effort. Factor IV--Internal Resource Competition included Enrollment Ratio, School Staff and Teacher Ratio. The loading matrix is shown in Table 1.

TABLE 1

Loading Matrix for Oblique Solution

Variable	Factor I	Factor II	Factor III	Factor IV
DS	98			
DE	95			
CP	93			
HSE	93			
NCLE	86			
AENGLC		92		
PP		88		
SS			72	
ER			66	
TR			56	
BR				85
SR				82
E				52

Note: Only loadings >40 have been shown. Decimals have been omitted from all entries.

The effects of environmental variables on organizational structure were examined using high schools in single high school districts. This decision was made so that for a given student service group there was no other comparable public service provider. A 33 1/3 per cent sample (N=25) was taken from the Connecticut population of communities (N=75) that support a single high school.

In the 25 schools in the sample faculty members in each school were randomly sampled to produce 30 potential respondents per school. Teachers in this pool were asked to complete the Structural Properties Questionnaire Form-IV. The SPQ-IV is a 45-item instrument which asks teachers to indicate their degree of agreement, on a four-point Likert scale, with general statements about their school.

INSTRUMENTATION

The SPQ-IV was developed by Murphy, Bishop and George (1975). It was designed to measure bureaucracy in a multi-dimensional manner in elementary and secondary schools. The conceptual scheme was developed to be consistent with most organizational theorists, including the generally accepted characteristics of Weber's (1946) Bureaucratic Theory and relies most heavily upon the work of Hage (1965).

The construct validity of the SPQ was assessed using a Principal Component analysis (N=518). An oblique rotation produced 13 interpretable factors with eigenvalues greater than unity accounting for 62.2% of the explained variance.

Each of the 13 factors could be unambiguously assigned to one of the three means constructs (Complexity, Centralization or Formalization). The produced factor structure was very similar to that reported by Murphy, Bishop and George (1975). The factor structure can be found in Appendix A.

The reliability of the three subscales of th SPQ was assessed using the Reliability routine of SPSS. Internal consistency estimates for each of the subscales were determined using Cronbach's coefficient alpha. The reliabilities as well as associated subscale statistics are shown in Table 2.

STATISTICAL PROCEDURES

Multiple regression analysis was used to examine the relationships between the community background variables and the structural properties of high schools.

TABLE 2

SPQ Subscale Statistics and Alpha Reliabilities

Subscale	Complex	Central	Formal
# of Items	11	14	19
Mean	27.78	28.69	48.92
S. D.	5.93	7.58	9.29
Reliability	0.70	0.79	0.78

The original 13 independent variables were grouped intuitively into three meaningful clusters: Support

Resource (Ability, Effort, Net Current Local Expenditures and Per Pupil Expenditure), Demand Resource (Community Population, District Enrollment, School Enrollment, Size of District Staff and Size of School Staff), and Resource Competition (Enrollment Ratio, Budget Ratio, Staff Ratio and Teacher Ratio). A fourth cluster, Community Characteristics, was produced through factor analysis of the independent variables. It included Community Size, Ability to Support Education, External Resource Competition and Internal Resource Competition.

The three subscales (Complexity, Centralization and Formalization) derived from the Structural Properties Questionnaire served as the dependent variables in the regression analysis.

The predictor community background variables in each cluster were allowed to enter the analysis in a stepwise fashion. In the stepwise method used here the variables entered into the equation in the order of increased contribution to explained variance after accounting for variables already in the equation (Kerlinger & Pedhazur, 1973, p. 291). An F-ratio was used to determine if each entering predictor accounted for a significant increase in explained variance in the criterion.

The small sample size (N=25) presented a dilemma in the presentation of the results of the regression analyses. All analyses were done at the .05 level of significance. Several of the tests which failed to be rejected at the

stated level of significance would have been rejected if a test at the .10 level had been conducted. Because of the potential importance of these relationships, they have been reported. The results of these regression analyses are summarized in Tables 3-6.

FINDINGS

The primary finding of this research is that the community background variables are related to bureaucratic characteristics, i.e., internal structure in schools.

Some of the more interesting findings were: (1) a community's Ability (wealth per capita) was negatively related ($r = -.47$) to and accounted for 22.1% of the explained variance in Centralization; (2) Internal Resource Competition, i.e., competition for resources (staff and students) within the district, accounted for 17.7% of the variance in Complexity; (3) Ability to Support Education was negatively related ($r = -.40$) to and accounted for 15.8% of the variance in Centralization and 16.3% of the variance in Formalization; and (4) the variable External Resource Competition (competition with other municipal departments for resources) was found not to be related to any of the structural variables.

A secondary finding of this research was a confirmation of the usefulness of the Structural Properties Questionnaire for assessing the presence of bureaucratic properties of Complexity, Centralization and Formalization in high

TABLE 3

Stepwise Multiple Regression for the Relationships Between Support Resource Variables and Structural Characteristics of High Schools
N=25

Step	Variable Entered	R	SE	R^2	Increase R^2	R^1	F
			Complexity				
1	PP	.242	.173	.058			1.427
2	NCLE	.314	.173	.099	.040		0.980
3	AENGLC	.327	.176	.107	.009		0.202
4	E[1]						
			Centralization				
1	AENGLC	.470	.221	.221		.186	6.506*
2	PP	.543	.215	.295	.074		2.323
3	E	.545	.219	.295	.002		0.054
4	NCLE[1]						
			Formalization				
1	AENGLC	.379	.175	.144			3.854**
2	NCLE	.415	.176	.172	.029		0.757
3	E	.455	.176	.207	.035		0.928
4	PP	.487	.177	.237	.030		0.789

Note: R^1 represents the shrunken R at the last significant step. The F reported is for the significance of the variable at the point of entry.
[1]Variable did not account for sufficient additional variance to be included.

AENGLC=Ability NCLE=Net Current Education Expenses PP=Per Pupil Expense E=Effort

* p<.05 **p<.10

TABLE 4

Stepwise Multiple Regression for the Relationships Between Demand Resource Variables and Structural Characteristics of High Schools
N=25

Step	Variable Entered	R	SE	R^2	Increase R^2	R^1	F
			Complexity				
1	SS	.293	.170	.086			2.167
2	CP	.323	.173	.104	.018		0.448
3	HSE	.375	.173	.104	.036		0.879
4	DS	.395	.176	.156	.016		0.372
5	DE[1]						
			Centralization				
1	CP	.131	.248	.017			0.403
2	HSE	.349	.240	.122	.105		2.619
3	DS	.386	.242	.149	.028		0.681
4	SS	.400	.247	.156	.007		0.168
5	DE	.415	.251	.172	.016		0.364
			Formalization				
1	SS	.367	.176	.135			3.590**
2	HSE	.506	.167	.256	.121		3.571**
3	CP	.517	.169	.267	.011		0.324
4	DS	.552	.169	.337	.032		0.930
5	DE	.581	.169	.337	.032		0.930

Note: CP has acted as a suppressor variable with respect to HSE and Centralization. R^1 represents the shrunken R at the last significant step. The F reported is for the significance of the variable at the point of entry.
[1]Variable did not account for sufficient additional variance to be included.

SS=School Staff CP=Community Population HSE=High School Enrollment DS=District Staff DE=District Enrollment

**p<.10

TABLE 5

Stepwise Multiple Regression for the Relationships Between Resource Competition Variables and Structural Characteristics of High Schools
N=25

Step	Variable Entered	R	SE	R^2	Increase R^2	R^1	F
			Complexity				
1	ER	.352	.167	.124			3.261**
2	BR	.381	.167	.145	.021		0.536
3	TR	.413	.170	.171	.025		0.645
4	SR	.435	.172	.190	.019		0.472
			Centralization				
1	ER	.279	.241	.078			1.941
2	SR	.341	.241	.116	.038		0.953
3	BR	.497	.227	.247	.131		3.661**
4	TR[1]						
			Formalization				
1	SR	.168	.186	.028			0.665
2	BR	.289	.185	.083	.055		1.325
3	ER	.373	.184	.139	.056		1.368
4	TR	.573	.174	.263	.124		3.363**

Note: R^1 represents the shrunken R at the last significant step. The F reported is for the significance of the variable at the point of entry. SR has acted as a suppressor variable with respect to BR and Centralization and SR and BR have acted as suppressor variables with respect to TR and Formalization.
[1]Variable did not account for sufficient additional variance to be included.

ER=Enrollment Ratio BR=Budget Ratio SR=Staff Ratio
TR=Teacher Ratio

**p<.10

TABLE 6

Stepwise Multiple Regression for the Relationships Between Community Characteristics Variables and Structural Characteristics in High Schools
N=25

Step	Variable Entered	R	SE	R2	Increase R^2	R^1	F
			Complexity				
1	Int Comp	.421	.162	.177		.141	4.947*
2	Ability	.455	.162	.207	.030		0.834
3	Size	.460	.166	.211	.004		0.110
4	Ext Comp	.461	.170	.212	.001		0.028
			Centralization				
1	Ability	.398	.230	.158		.122	4.323*
2	Ext Comp	.436	.230	.190	.032		0.867
3	Size	.446	.235	.199	.009		0.237
4	Int Comp	.448	.240	.201	.002		0.046
			Formalization				
1	Ability	.404	.173	.163		.127	4.490*
2	Size	.440	.174	.194	.030		0.828
3	Int Comp	.464	.175	.215	.022		0.579
4	Ext Comp	.476	.178	.226	.011		0.281

Note: R^1 represents the shrunken R at the last significant step. The F reported is for the significance of the variable at the point of entry.

Ability=Ability to Support Education Size=Community Size Int Comp=Internal Resource Competition Ext Comp=External Resource Competition

*p<.05

schools. The SPQ was found to be a valid and reliable tool for identifying the organizational characteristics previously discussed by Hage (1965), Hage and Aiken (1967a, 1967b), Bishop and George (1973) and Murphy, Bishop and George (1975). The construct validity of the SPQ was assessed using Principal Component analysis (N=518). An oblique rotation produced 13 interpretable factors with eigenvalues greater than unity accounting for 62.2% of the explained variance. Each of the 13 factors could be unambiguously assigned to one of the three means constructs. Internal consistency estimates for each of the subscales of the SPQ were determined using Cronbach's coefficient alpha: Complexity = .70; Centralization = .79; and Formalization = .78.

EDUCATIONAL IMPORTANCE

The dimensions of organizational structure often serve as determiners of various forms of organizational behavior. The literature (Hage & Aiken, 1967a; Baker, 1975; Baldridge, 1975; Baldridge & Deal, 1975; Deal, Meyer and Scott, 1975) indicates that structure is related to frequency of adaptation in organizations. If administrators are to fulfill their missions as change agents and leaders of viable organizations they need to be aware of those forces in the environment that are related to structure. With a knowledge of the environment the administrator can plan for long-range adaptation and survival of the organization.

Centralization is a power variable and the negative relationship (r = -.40) that exists between community wealth and locus and intensity of power within a school should be of interest to all administrators. Also, community support for education was negatively related (r = -.40) to Formalization (rule specificity and enforcement). According to Hage (1965) lower levels of Formalization should lead to increased Job Satisfaction. Conversely, increased Formalization can lead to decreased Satisfaction and the substitution of rule compliance for the legitimate goals of the organization.

APPENDIX A

The factors and constituent items were assigned to the scales of Complexity, Centralization and Formalization in the following manner:

A. Complexity

I. Job Specification

28. Teachers are allowed to teach outside of their major area of study.

31. Teachers are allowed to teach outside of their major and minor area of study.

36. Teachers here teach outside of their field of specialization.

II. Academic Degrees

9. Academic degrees are an important consideration in recruitment of administrative staff.

22. Academic degrees are an important consideration in the recruitment of instructional staff.

16. Advanced degrees are an important consideration in promotion.

III. Professional Growth Opportunities

15. Teachers make visitations to schools outside the district.

21. Teachers attend professional conferences during the school year.

14. Teachers receive help from an instructional media specialist in the use of audio-visual equipment.

IV. Non-Professional Tasks

27. Teachers are required to do paper work which could be done by school office staff.

B. Centralization

I. Decision-Making w/Hierarchy

11. Vice-principals and department chairman in your school must refer most non-routine decisions to someone higher up for a final O.K.

6. Principals in your district must refer most non-routine decisions to someone higher up for the final O.K.

32. Teachers in your school must refer most non-routine decisions higher up for a final O.K.

18. Even small matters often have to be referred to someone higher up for a final O.K.

24. There can be little action taken here until a superior approves a decision.

40. Teachers are required to go through channels (chain of command) for routine decisions.

37. Any decision that I make has to have my superior's approval.

II. Supervision

45. Rules requiring teachers to sign in and out are strictly followed.

42. Teachers' daily activities must have the approval of a superior.

43. Teachers in this school are closely supervised.

III. Curricular Decision-Making

3. Who has the greatest influence in decisions about textbook selection?

1. Who has the greatest influence in decisions about the instructional program?

2. Who has the greatest influence in decisions about teaching methods?

4. Who has the greatest influence in decisions about curricular offerings?

C. Formalization

I. Standardization of Rules

33. Administrators strictly follow established rules and regulations in dealing with the teaching staff.

19. At this school, procedures for the disciplining of students are well defined.

12. Teachers' responsibilities and lines of authority within the school are well defined.

34. The Principal's activities are governed by written rules and regulations.

25. Teachers' activities are governed by written rules and regulations.

17. Teachers are evaluated according to a formalized procedure.

30. People here are allowed to do almost as they please.

26. Most people here make their own rules on the job.

44. Teachers are allowed to violate minor rules and regulations.

II. Lesson Plans

29. Teachers are required to maintain lesson plans.

38. Teachers are required to submit lesson plans.

III. Teacher Freedom from Rules

13. Teaching in your school is a good job for someone who likes to be "his own boss."

35. A teacher can make his own decisions concerning instructional problems without checking with anyone else.

IV. Principal's Flexibility

41. The Principal is willing to by-pass regulations to help pupils.

39. The Principal is willing to by-pass regulations to help teachers.

V. Course of Study

23. Teachers are allowed to teach only those subjects which are included in the course of study.

10. Teachers are required to follow an adopted course of study.

5. Teachers are required to follow suggested instructional sequences and unit plans as closely as possible.

Item 20 was not loaded on any factor

20. How things are done is left up to the person doing the work.

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